

CLAIMS:

1. An optical amplifier (200/600) for amplifying an optical input signal (208/608), comprising:
  - a first optical coupler (206/606), for splitting the optical input signal (208/608) into a first optical signal (210/610) and a second optical signal (212/612);
  - a first amplifier section (202/602) responsive to receive the first optical signal (210/610), the first amplifier section (202/602) comprising:
    - a first rare earth doped optical fiber (220/620) for generating a first optical output power (230/630);
    - a first pump source (222/622); and
    - a second pump source (224/624), the first and second pump sources for supplying a first energy amount, in a common wavelength band, to the first rare earth doped optical fiber (220/620); and
  - a second amplifier section (204/604) responsive to receive the second optical signal (212/612), the second amplifier (204/604) section arranged in parallel to, and under common control with, the first amplifier section (202/602), the second amplifier section (204/604) comprising:
    - a second rare earth doped optical fiber (240/640) for generating a second optical output power (250/650);
    - a third pump source (232/632); and
    - a fourth pump source (234/634), the third and fourth pump sources for supplying a second energy amount, in the common wavelength band, to the second rare earth doped optical fiber (240/640),
  - a total power (280/680) of the first optical output power (230/630) and the second optical output power (250/650) at least about 600 mill Watts.
2. The optical amplifier (200) according to claim 1, wherein the common wavelength band comprises a wavelength band of about 1540-1570nm.

3. The optical amplifier (200) according to claim 1, wherein the first rare earth doped optical fiber (220) is doped with erbium, and wherein the second rare earth doped optical fiber (240) is doped with erbium.

4. The optical amplifier (200) according to claim 1, wherein the first pump source (222) is arranged in such a manner to supply energy to the first erbium doped optical fiber (220) in a forward direction relative to the first optical signal (210), and the second pump source (224) is arranged in such a manner to supply energy to the first erbium doped optical fiber (220) in a reverse direction relative to the first optical signal (210).

5. The optical amplifier (200) according to claim 4, wherein the third pump source (232) is arranged in such a manner to supply energy to the second erbium doped optical fiber (240) in a forward direction relative to the second optical signal (212), and the fourth pump source (234) is arranged in such a manner to supply energy to the second erbium doped optical fiber (240) in a reverse direction relative to the second optical signal (212).

6. The optical amplifier (200) according to claim 1, further comprising:  
at least one wave division multiplexer ("WDM") (226/228) disposed in the first amplifier section (202), responsive to supply the first energy amount to the first rare earth doped fiber (220); and  
at least one WDM (236/238) disposed in the second amplifier section (204), responsive to supply the second energy amount to the second rare earth doped fiber (240).

7. The optical amplifier (200) according to claim 6, further comprising:  
a second optical coupler (260), for splitting the first optical output power (230) into a first plurality of output signals; and  
a third optical coupler (270), for splitting the second optical output power (250) into a second plurality of output signals.

8. The optical amplifier (200) according to claim 7, wherein the first plurality of output signals comprises four output signals, and wherein the second plurality of output signals comprises four output signals.

9. The optical amplifier (200) according to claim 1, wherein the first, second, third and fourth pump sources (222, 224, 232, 234) comprise single-mode pump sources.

10. The optical amplifier (200) according to claim 9, wherein at least one of the first, second, third and fourth pump sources (222, 224, 232, 234) has switched temperature and optical power control.

11. The optical amplifier (200) according to claim 1, further comprising:  
a third rare earth doped optical fiber (214) for generating the optical input for transmission to the first optical coupler (206); and  
a fifth pump source (216), for supplying energy to the third rare earth doped optical fiber (214).

12. The optical amplifier (200) according to claim 11, wherein a total power (280) of the first optical output power (230) and the second optical output power (250) is increased to a range between about 600 mill Watts to 900 mill Watts.

13. The optical amplifier (200/600) according to claim 1, wherein the first, second, third and fourth pump sources (622, 624, 632, 634) comprise multimode pump sources.

14. The optical amplifier (600) according to claim 13, further comprising:  
a third rare earth doped optical fiber (615) for generating the optical input (608) for transmission to the first optical coupler (606); and  
a fifth pump source (615), for supplying energy to the third rare earth doped optical fiber.

15. The optical amplifier (600) according to claim 13, wherein at least one of the first, second, third and fourth pump sources (622, 624, 632, 634) has switched temperature and optical power control.

16. The optical amplifier (600) according to claim 14, wherein the first rare earth doped optical fiber (620) is doped with erbium and ytterbium, and wherein the second rare earth doped optical fiber (640) is doped with erbium and ytterbium.

17. The optical amplifier (600) according to claim 16, further comprising:  
a first multimode power combiner (626) responsive to receive the first energy amount and to supply the first energy amount to the first rare earth doped optical fiber (620); and

a second multimode power combiner (636) responsive to receive the second energy amount and to supply the second energy amount to the second rare earth doped optical fiber (640).

18. The optical amplifier (600) according to claim 17, further comprising:  
a first high-power isolator (642) responsive to receive the first optical output power (630); and

a second high-power isolator (644) responsive to receive the second optical output power (650).

19. The optical amplifier (600) according to claim 18, wherein the first and second high-power isolators (642, 644) comprise WDMs in the common wavelength band.

20. The optical amplifier (600) according to claim 16, wherein a total power of the first optical output power (630) and the second optical output power (650) is at least about 1 Watt.

21. An optical amplifier (200/600) for amplifying an optical input signal (208/608), comprising:

a first optical coupler (206/606), for splitting the optical input signal (208/608) into a first optical signal (210/610) and a second optical signal (212/612);

a first amplifier section (202/602) responsive to receive the first optical signal (210/610), the first amplifier section (202/602) comprising:

a first rare earth doped optical fiber (220/620) for generating a first optical output power (230/630), the first rare earth doped optical fiber (220/620) having a first input;

a first pump source (222/622) coupled to the first input, for supplying a first energy amount to the first rare earth doped optical fiber (220/620); and

a second amplifier section (204/604) responsive to receive the second optical signal (212/612), the second amplifier section (204/604) arranged in parallel to, and under common control with, the first amplifier section (202/602), the second amplifier section (204/604) comprising:

a second rare earth doped optical fiber (240/640) for generating a second optical output power (250/650), the second rare earth doped optical fiber (240/640) having a second input;

a second pump source (232/632) coupled to the second input, for supplying a second energy amount to the second rare earth doped optical fiber (240/640),

a total power (280/680) of the first optical output power (230/630) and the second optical output power (250/650) at least about 600 mill Watts.

22. A method for amplifying an optical input signal (208/608), comprising:  
splitting the optical input signal into a first optical signal (210/610) and a second optical signal (212/612);

receiving the first optical signal (210/610) at a first amplifier section (202/602), the first amplifier section (202/602) having a first rare earth doped optical fiber (220/620) for generating a first optical output power (230/630);

supplying a first energy amount to the first rare earth doped optical fiber (220/620) via a first pump source (222/622) and a second pump source (224/624), the first and second pump sources operating in a common wavelength band;

receiving the second optical signal (212/612) at a second amplifier section (204/604), the second amplifier section (204/604) arranged in parallel to, and under common control with, the first amplifier section (202/204), the second amplifier section having a second rare earth doped optical fiber (240/640) for generating a second optical output power (250/650); and

supplying a second energy amount to the second rare earth doped optical fiber (240/640) via a third pump source (232/632) and a fourth pump source (234/634) operating in the common wavelength band,

a total power of the first optical output power (230/630) and the second optical output power (250/650) at least about 600 mill Watts.